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10/052,570	01/23/2002	Ryuichi Otogawa	020068	7381

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EXAMINER	
MUTSCHLER, BRIAN L	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

S.C.

Office Action Summary	Application No.	Applicant(s)
	10/052,570	OTOGAWA ET AL.
	Examiner	Art Unit
	Brian L. Mutschler	1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 24 September 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 24 September 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Comments

1. The rejection of claims 1-12 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment to the claims. It is noted that Applicant's amendment presents a new type of invention (i.e., apparatus claims). However, the limitations originally presented in claims 1-12 recite structural limitations that support the apparatus claims. Furthermore, the preamble of the original claims supports the process claims now added.

Drawings

2. The drawings were received on September 24, 2004. These drawings are acceptable.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Motohashi et al. (U.S. Pat. No. 6,663,758) in view of JP 08-109490, herein referred to as JP '490.

Regarding claims 1 and 13, Motohashi et al. disclose a method and apparatus for electrolytically producing copper foil using a rotating drum cathode **2** and anodes **3**, wherein the foil is continuously formed and peeled off (fig. 2; col. 3, line 14 to col. 5, line 12). In addition, Motohashi et al. teach the use of an auxiliary anode **7** positioned downstream from the direction of flow of the electrolytic solution (fig. 2). The anodes are made of titanium coated with a platinum metal oxide (col. 4, lines 39-40). In addition, the current density of the auxiliary anode **7** is varied between current densities of 80, 120, 160, and 200 A/dm^2, which is higher than the current density of 40 A/dm^2 used for the anode **3** (col. 5, lines 47-64).

Regarding claims 2 and 14, the foil is a copper foil (col. 2, lines 14-16).

The method and apparatus of Motohashi et al. differs from the instant invention because Motohashi et al. do not disclose the following:

a. An intermediate layer of tantalum or a tantalum alloy formed between the coating layer and the substrate, as recited in claims 1 and 13.

b. The titanium alloy is an alloy selected from titanium-tantalum, titanium-tantalum-niobium, titanium-palladium, or a combination of at least two of the alloys, as recited in claims 3 and 15.

c. The intermediate layer is formed by sputtering, ion plating, or vacuum evaporation, as recited in claim 4.

d. The tantalum alloy is a tantalum-niobium alloy and/or a tantalum-titanium alloy, as recited in claims 5 and 16.

e. The intermediate layer is 1 to 10 μm in thickness, as recited in claim 6.

f. The valve metal is titanium, tantalum, niobium, zirconium, or a combination of at least to of the metals, as recited in claim 7.

g. The electrode active substance is a mixture selected from iridium oxide and tantalum oxide; iridium oxide and titanium oxide; iridium oxide and ruthenium oxide; iridium oxide, ruthenium oxide, and titanium oxide; ruthenium oxide and titanium oxide; and ruthenium oxide and tantalum oxide, as recited in claims 8 and 17.

h. The electrode active substance contains a mixture of 60 to 95 wt. % iridium oxide and 5 to 40 wt. % tantalum oxide, as recited in claim 9.

i. The electrode active substance contains a mixture of 70 to 95 wt. % iridium oxide and 5 to 30 wt. % tantalum oxide, as recited in claim 10.

j. The coating layer is formed by thermal decomposition, electrochemical oxidation, or powder sintering, as recited in claim 11.

k. The coating layer is 1 to 50 μm in thickness, as recited in claim 12.

Regarding claims 1, 4-6, 13, and 16, JP '490 discloses an intermediate layer of tantalum or a tantalum alloy formed between the substrate and the coating to prevent the passivation of the base material (par. [0004]). The tantalum or tantalum alloy layer is formed by sputtering to a thickness of 1-5 μm (par. [0011]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method and apparatus of Motohashi et al. to use an intermediate layer of tantalum or a tantalum alloy as taught by JP '490 because the intermediate layer prevents the passivation of the titanium substrate. It would also

have been obvious to use a tantalum-niobium or tantalum-titanium alloy as the tantalum alloy intermediate layer because niobium and titanium have similar physical and chemical properties as tantalum, and they are much less expensive.

Regarding claims 3 and 15, JP '490 teaches that the substrate may comprise titanium, titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium (par. [0008]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the titanium substrate of Motohashi et al. to use and alloy selected from titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium as taught by JP '490 because JP '490 teaches that such materials are equivalent materials suitable for use in electroplating anodes.

Regarding claims 7-12 and 17 JP '490 discloses electrode active materials comprising platinum metal oxides, iridium-tantalum mixed oxide, iridium-titanium mixed oxide, iridium-ruthenium mixed oxide, iridium-ruthenium-titanium mixed oxide, ruthenium-titanium mixed oxide, ruthenium-tantalum mixed oxide, and iridium-platinum-tantalum mixed oxide (par. [0012]). The electrode active material is formed on the intermediate layer by thermal decomposition, electrochemical oxidation, powder sintering, or sputtering (par. [0014]). JP '490 teaches that a preferred coating comprises 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide (par. [0013]). The

coating is deposited at a density of 2-200 g/m^2 (see par. [0013]), which results in a thickness within the claimed ranged based on the density of the materials.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the platinum metal oxide coating of Motohashi et al. to use a 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide formed by thermal decomposition method as taught by JP '490 because JP '490 teaches that such coatings are equivalent coatings to platinum metal oxide coatings and are suitable for use as anode coatings for electroplating.

5. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolski et al. (U.S. Pat. No. 5,215,646) in view of JP 08-109490.

Regarding claim 1, Wolski et al. disclose an apparatus for electroforming a copper foil using a rotating cathode drum **21**, anodes **24,25**, and an auxiliary anode **27**, wherein the copper foil is continuously formed and peeled off (fig. 1; col. 5, lines 14-68). The anodes are made of platinized titanium or iridium or ruthenium oxides (col. 5, lines 29-31).

Regarding claim 2, the foil is a copper foil (col. 5, lines 21-24).

The apparatus of Wolski et al. differs from the instant invention because Wolski et al. do not disclose the following:

a. An intermediate layer of tantalum or a tantalum alloy formed between the coating layer and the substrate, as recited in claim 1.

b. The titanium alloy is an alloy selected from titanium-tantalum, titanium-tantalum-niobium, titanium-palladium, or a combination of at least two of the alloys, as recited in claim 3.

c. The intermediate layer is formed by sputtering, ion plating, or vacuum evaporation, as recited in claim 4.

d. The tantalum alloy is a tantalum-niobium alloy and/or a tantalum-titanium alloy, as recited in claim 5.

e. The intermediate layer is 1 to 10 μm in thickness, as recited in claim 6.

f. The valve metal is titanium, tantalum, niobium, zirconium, or a combination of at least to of the metals, as recited in claim 7.

g. The electrode active substance is a mixture selected from iridium oxide and tantalum oxide; iridium oxide and titanium oxide; iridium oxide and ruthenium oxide; iridium oxide, ruthenium oxide, and titanium oxide; ruthenium oxide and titanium oxide; and ruthenium oxide and tantalum oxide, as recited in claim 8.

h. The electrode active substance contains a mixture of 60 to 95 wt. % iridium oxide and 5 to 40 wt. % tantalum oxide, as recited in claim 9.

i. The electrode active substance contains a mixture of 70 to 95 wt. % iridium oxide and 5 to 30 wt. % tantalum oxide, as recited in claim 10.

j. The coating layer is formed by thermal decomposition, electrochemical oxidation, or powder sintering, as recited in claim 11.

k. The coating layer is 1 to 50 μm in thickness, as recited in claim 12.

Regarding claims 1and 4-6, JP '490 discloses an intermediate layer of tantalum or a tantalum alloy formed between the substrate and the coating to prevent the passivation of the base material (par. [0004]). The tantalum or tantalum alloy layer is formed by sputtering to a thickness of 1-5 μm (par. [0011]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Wolski et al. to use an intermediate layer of tantalum or a tantalum alloy as taught by JP '490 because the intermediate layer prevents the passivation of the titanium substrate. It would also have been obvious to use a tantalum-niobium or tantalum-titanium alloy as the tantalum alloy intermediate layer because niobium and titanium have similar physical and chemical properties as tantalum, and they are much less expensive.

Regarding claim 3, JP '490 teaches that the substrate may comprise titanium, titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium (par. [0008]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the titanium substrate of Wolski et al. to use and alloy selected from titanium-tantalum, titanium-tantalum-niobium, or titanium-palladium as taught by JP '490 because JP '490 teaches that such materials are equivalent materials suitable for use in electroplating anodes.

Regarding claims 7-12, JP '490 discloses electrode active materials comprising platinum metal oxides, iridium-tantalum mixed oxide, iridium-titanium mixed oxide,

iridium-ruthenium mixed oxide, iridium-ruthenium-titanium mixed oxide, ruthenium-titanium mixed oxide, ruthenium-tantalum mixed oxide, and iridium-platinum-tantalum mixed oxide (par. [0012]). The electrode active material is formed on the intermediate layer by thermal decomposition, electrochemical oxidation, powder sintering, or sputtering (par. [0014]). JP '490 teaches that a preferred coating comprises 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide (par. [0013]). The coating is deposited at a density of 2-200 g/m^2 (see par. [0013]), which results in a thickness within the claimed ranged based on the density of the materials.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the platinum metal oxide coating of Wolski et al. to use a 70-90 wt % iridium oxide and 10-30 wt. % tantalum oxide formed by thermal decomposition method as taught by JP '490 because JP '490 teaches that such coatings are equivalent coatings to platinum metal oxide coatings and are suitable for use as anode coatings for electroplating.

It is noted that claim 1 has been amended to recite the use of a pulse current. This limitation is a process limitation and does not structurally limit the claimed apparatus.

Response to Arguments

6. Applicant's arguments filed September 24, 2004, have been fully considered but they are not persuasive.

7. Applicant argues that "neither Motohashi nor JP '490 teaches, mentions or suggests that the pulse current is passed from the auxiliary anode to the cathode to adjust the pulse current density so that the pulse current density of the auxiliary anode is greater than that of the anode when electrodeposition is started" (see page 16 of Applicant's response).

8. This argument is not persuasive because Motohashi et al. teach that the anode has a uniform current density of 40 A/dm^2 and the auxiliary anode has a current density that varies between 80, 120, 160, and 200 A/dm^2 (US '758 at col. 5, lines 47-64). Because the auxiliary anode current density is varied between fixed values, it is pulsed. Therefore, Motohashi et al. do teach the use of a pulsed current density with the auxiliary anode that is greater than the anode. A pulsed current density necessarily requires pulsed current.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BLM

BLM
October 29, 2004

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